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DEATH-RATE AND SANITATION IN RUSSIA.

A SERIES of admirable articles on vital statistics and the importance of sanitary measures is now appearing in one of the St. Petersburg daily papers, says the *Lancet*, founded on a paper by Dr. Eck. The statistics given are certainly of a nature to set every one in Russia thinking seriously about taking measures to improve them. Thus for the year 1882, which seems to be the last year whose vital statistics are available, the mortality in the ten southern provinces was 2.6 per cent; in the seven eastern provinces, 3.9 per cent; in the thirteen middle provinces, 6.2 per cent; in the sixteen western provinces, 3.1 per cent; and in the fourteen northern provinces, 3.7 per cent. After mentioning the various sanitary improvements called for, as drainage of various kinds, a supply of wholesome drinking-water, attention to and regulations about buildings of all descriptions, and the establishment of infectious hospitals, Dr. Eck goes on to say: "There is no need for us to puzzle ourselves how these matters are to be done; England has accomplished so much, that we need simply adapt what is ready to our hands to our own circumstances. In Germany, France, Austria, and Italy, steps are already being taken in the same direction, and all these countries take England as their chief model, so that we need not be ashamed to do so too." He then appeals to the economic importance to Russia of a reduction of the mortality.

On the principle of example being better than precept, he goes into a long but easily comprehensible calculation of the comparative working-value of horses whose ages at death vary; and he then takes the respective death-rates of Russia (35), Germany (27), and England (19), and, by means of a method of computation unusual amongst British statisticians, explains that they show that an Englishman has 53 years of life, while a German has 37, and a Russian 29 only. Reckoning a man's working-years to commence at the age of 18, an Englishman has 35 years in which to earn, against the Russian's 11; and the latter will probably not save much more in his 11 working-years, above what it costs him to live, than has been already expended upon him during his 18 unproductive years; but an Englishman will have 24 years more in which to go on earning and saving. Again, out of 1,000 inhabitants in Russia, only 373, or 37 per cent, are of an age to earn, while in England there are 660, or 66 per cent; or each individual of working-age in Russia has to provide for two non-workers, while in England he has only half a non-worker for whom to be responsible.

MUIR'S THERMAL CHEMISTRY.

THE recognition of the dual character of the phenomena involved in chemical operations is no new thing; but it is only of late that the attempt has been made to determine the relationship between transformations of matter and concurrent changes of energy, and the efforts to this end have been made almost wholly in the direction of thermal phenomena, — in the investigation of the quantities of heat which enter or leave a chemical system during the transition between accurately defined initial and final states, in a so-called chemical change.

Mr. Muir's presentation of the condition and aims of the thermal chemistry of to-day is opportune. Based as a matter of necessity upon the researches of Thomsen and Berthelot, it fairly bristles with references to the works of these masters, and, indeed, to all original papers of importance in the discussion of the subject. Following an outline sketch of the theory of energy and the molecular hypothesis, the author discusses successively the methods of thermal experimentation and their application to the phenomena of allotropy; isomerism; the neutralization of acids by bases, and bases by acids; the relative avidity (as Thomsen terms it) of acids; the classification of elements and compounds in accordance with thermo-chemical properties; the phenomena of melting, boiling, evaporation, dissociation, solution, and hydration; and, finally, the chemical interpretation of thermal data. Only such facts as are immediately of use for purposes of illustration appear in the body of the book; but all well-established data of the subject (excepting such as relate to boiling and melting points and specific heats, for which reference elsewhere is made) are to be found in the five appendices, which comprise a third of the matter between the covers of the volume.

The work is for the most part independent in opinion, and, with no pretence to exhaustiveness, sufficiently full for the purposes of the general reader, and quite intelligible to one acquainted with the elements of general chemistry and modern ideas of energy. Facts are presented fearlessly and as separate as may be from the constraint of theory, and the explanation is fitted to the facts.

The stumbling-block in the way of the interpretation of thermal values is the difficulty, often the impossibility, of determining what portion of a thermal change is of chemical origin, and what is physical; and it is not surprising to find the use

The elements of thermal chemistry. By M. M. PATTISON MUIR, assisted by David Muir Wilson. London, Macmillan, 1885. 8°.